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A technique to train auditory and visual memory for speech patterns in young hearing-impaired children

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A TECHNIQUE TO TRAIN AUDITORY AND VISUAL MEMORY FOR SPEECH PATTERNS IN YOUNG HEARING-IMPAIRED CHILDREN.

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INTRODUCTION

The purpose of this study was to devise and examine a technique for training auditory memory for length of speech sounds in preschool age profoundly deaf children. To date, there has been very little published on auditory learning and memory for this age group and the possibilities of instrumentation have been largely unexplored. In this study, the visual mode of stimulus presentation was used for initial conditioning and training. Visual and auditory memory were both used as responses in anticipation of a future study on memory. I feel memory is an important part of learning and using language and that development of some of the prosodic features of speech such as rhythm, intensity, and pitch may be facilitated by emphasis on combined visual and auditory memory. Therefore, the ultimate goal for this technique would be to use it as a tool to study memory in very young children.

METHOD

Subjects: Three profoundly deaf females participated in this project. Their ages ranged from 4 yrs. 6 mos. to 6 yrs. 5 mos. and they will be referred to as Child 1, Child 2, and Child 3, respectively. (See Figures 1, 2, and 3.)

Materials: Mounted on a Language Master was a large screen with adjacent sliding panels. Nine inch Language Master cards were notched and divided into either 2, 3, 4, or 5 sections. Each section had a long or short auditory and visual stimulus. A peg board was made to accommodate a 9" Language Master card and a series of handmade pegs. (See Figure 4.)

Procedure: The procedure was divided into 5 main sections: visual same/different discrimination, visual recognition, visual memory, auditory/visual memory, and auditory memory. Same/different discrimination tasks preceeded memory tasks to ensure that each child could distinguish the variable--which was relative length of visual and acoustic speech like patterns (van Uden, 1968). Specifically, tasks required the child to find the different item in a series of visual or auditory stimuli and later to remember the entire series (Barry, 1969). The children were trained individually.

The vowel /ɑ/ was recorded several times on 9" Language Master cards, with a notch between each stimulus segment. These notches stop the movement of the cards as they go through the Language Master, so the speed of presentation can be adapted to each child. All stimulus sounds on a card were recorded with equal duration except one which either was longer or shorter than the others by approximately a 2:3 ratio. A rectangle analogous to the length of the auditory stimulus was taped on the card above each recorded segment.

For the visual same/different discrimination task, a card was placed on the Languge Master and the child was asked to point to the rectangle that was different. The stages of this task involved either 3, 4, or 5 rectangles on a card and the stage with 3 items had to be successfully completed before a child was allowed to move to the 4 item stage. A strict criterion for successful completion, however, was not enforced.

The visual recognition task was conducted in the same manner as visual same/different discrimination, but the required response was different. This time the children were asked to match wooden pegs to the length of the rectangles and to plsce them in order in a trough.

Visual memory was trained by presenting the rectangles of different length serially in time. A screen with an opening large enough to observe one rectangle was mounted on the Language Master. The stimulus card then was passed behind the screen and the child saw the stimuli go by one at a time. After the last stimulus disappeared, the child was required to duplicate the visual pattern from memory using the pegs. As an aid to peg placement, a card having the same number of divisions as the stimulus card was placed behind the trough. The children were expected to respond immediately, but if this proved to be an easy task, they instead were required to wait until the count of 10 to respond. There were 4 stages to this task which ranged in difficulty from 2 to 5 rectangles on a card.

Auditory/visual memory was trained in conjunction with the visual memory task. The Language Master cards again were passed behind the screen, but this time there was sound. The sound was presented from the loudspeaker of the Language Master free field to the child's hearing-aid microphone. The child received the visual and auditory cues simultaneously. It was emphasized to the child that she should listen carefully. Again, the response was the placement of pegs from memory. At this point, the child was

probably still relying on visual memory. This response was carried out for 3 stages, beginning with 2 stimuli per card.

The final task, auditory memory, was similar to the auditory/visual memory task, but without the visual cues.

Reinforcement was 1 token per correct response which was exchanged for candy or pretzels at the end of the session. Learning and test periods lasted between 10 and 20 minutes, including instructions.

RESULTS AND DISCUSSION

Child 1, age 4 yrs. 6 mos., participated in 5 sessions and Child 2, age 5 yrs. 10 mos., participated in 4. During the first 3 sessions with both children, I tried to teach the response to 'different' which was pointing. At the end of this time, I felt they understood the variable of length, but did not understand the desired response. So during the next session, the children started the visual recognition task which involved matching the peg length to the visual stimulus. Child 2 understood this task and completed the 2 item sets. Child 1 completed all of this task and during her final session she performed the visual memory task for the 2 item sets and one 3 item set.

Child 3, age 6 yrs. 5 mos., also participated in 5 sessions. During the first session, she completed the visual discrimination and recognition tasks. In the second session, she performed the visual memory task for 3 items in a set, both responding immediately and with a 10 count delay. In the third session, she completed the visual memory task and began to practice auditory/

visual memory. By the end of the 5th session, she had completed the auditory memory tasks for 4 item sets. (See Figure 5.)

Throughout the training and testing sessions, Child 1 progressed faster than Child 2, but both of these younger children were slower than Child 3.

CONCLUSIONS

The tasks were very easy for the oldest child and with more time, other acoustic dimensions of speech could have been explored. For this child, I can speculate that this method would be an effective way of teaching some of the prosodic features of speech. She was mature enough and interested enough to succeed. The two younger children were developing visual discrimination, recognition, and memory skills, but I do not know how far they could have progressed. They seemed to be motivated mainly by the tangible reward and their performance was limited by their short attention spans. Limitations of testing and training time make it difficult to draw any firm conclusions.

One of the important assets of a procedure such as this is that it can lay a foundation for speech work. Prosodic features, rather than syntactic features of language, are emphasized. Since the child must learn a concrete response for a specific feature of speech, there can be communication between teacher and child about what features the child understands. An observant teacher could learn as much from a child's consistent incorrect as well as correct, responses about how he is perceiving and handling visual and auditory stimuli. This type of procedure also provides the oppor-

tunity to develop the language of speech work with little confusion.

In planning a future study to look at visual and auditory perception and memory, I feel this technique would be feasible, especially if the children were 6 yrs. or older. Younger children could be studied but it would take a lot longer than for older children.

AUDIOGRAM OF Child 1 Age: 4yrs. 6mos. DATE

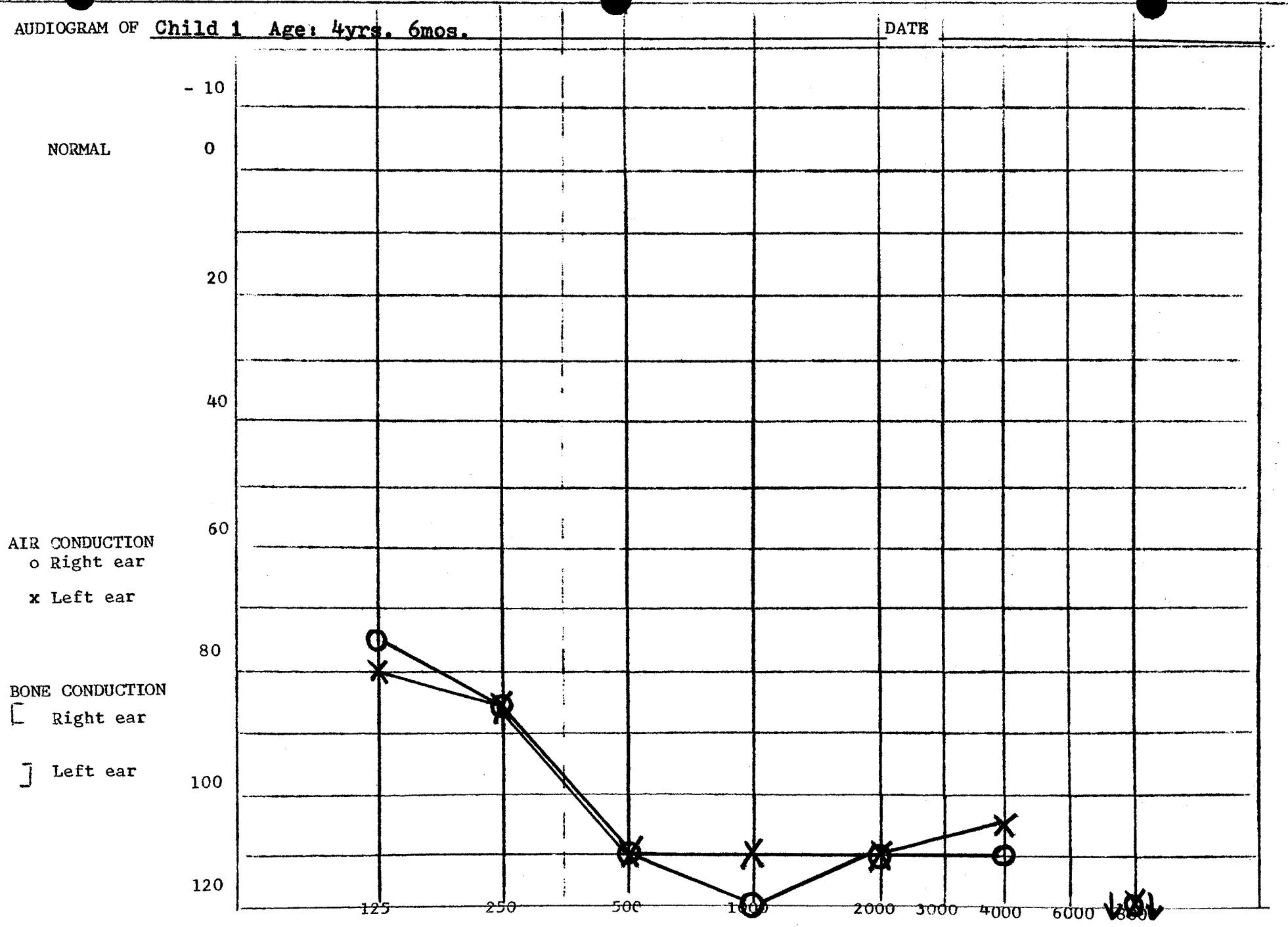

Fig. 1

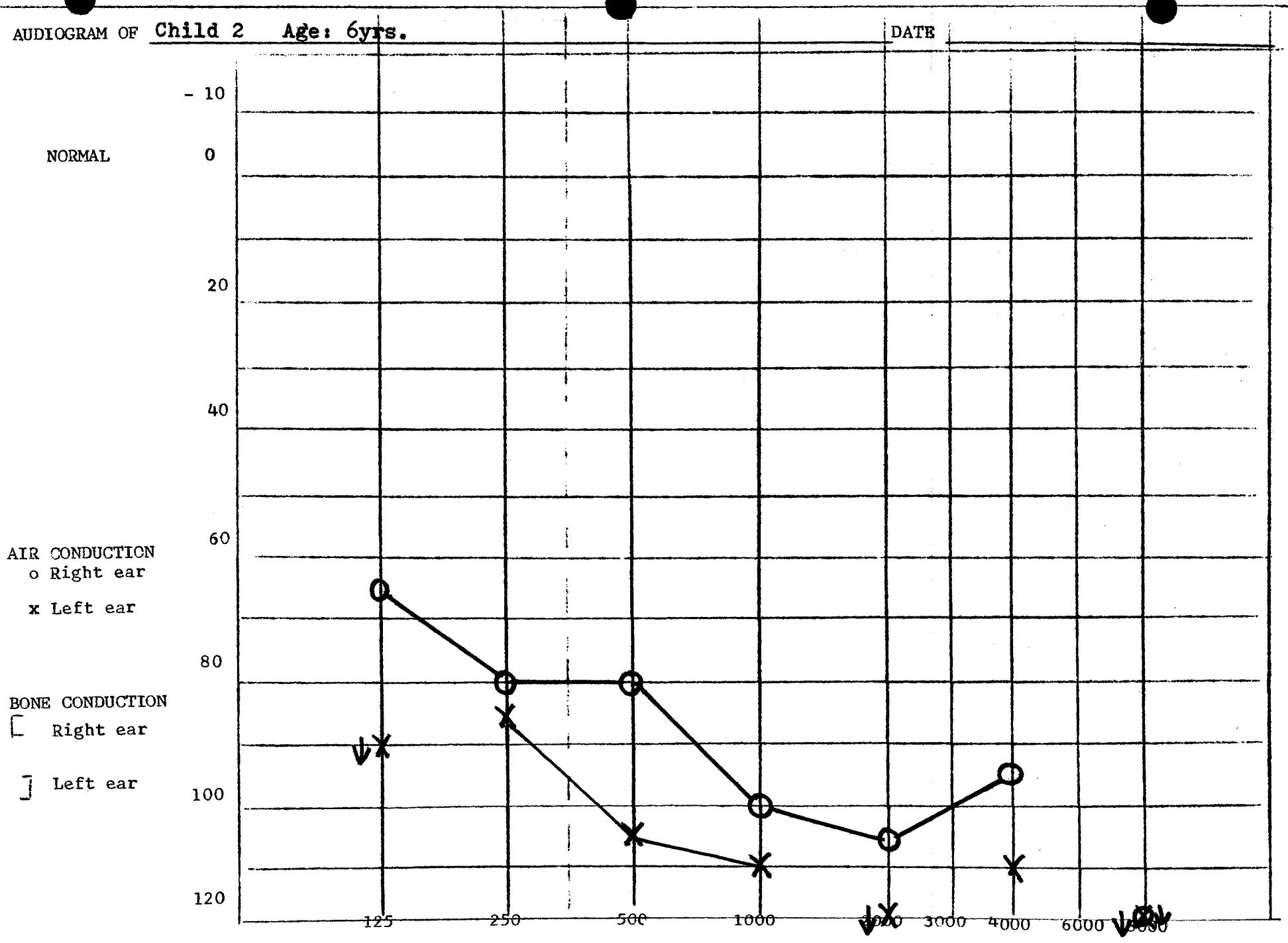
AUDIOGRAM OF Child 2 Age: 6yrs.
DATE
- 10
NORMAL
0
20
40
60
80
100
120
AIR CONDUCTION
o Right ear
x Left ear
BONE CONDUCTION
[Right ear
] Left ear
125
250
500
1000
3000
4000
6000

Fig. 2

AUDIOGRAM OF Child 3 Age: 6yrs. 5mos. DATE

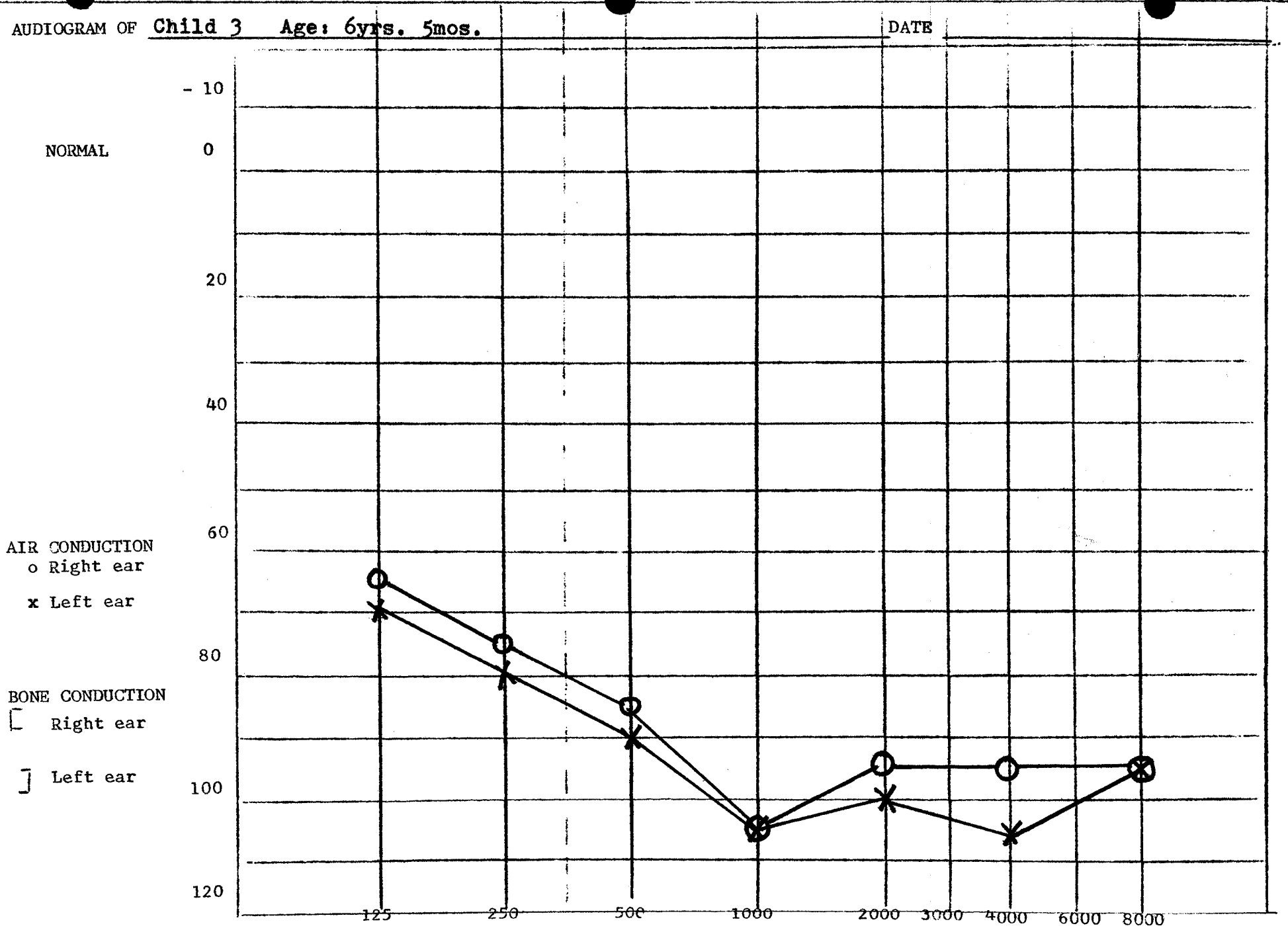

Fig. 3

MATERIALS

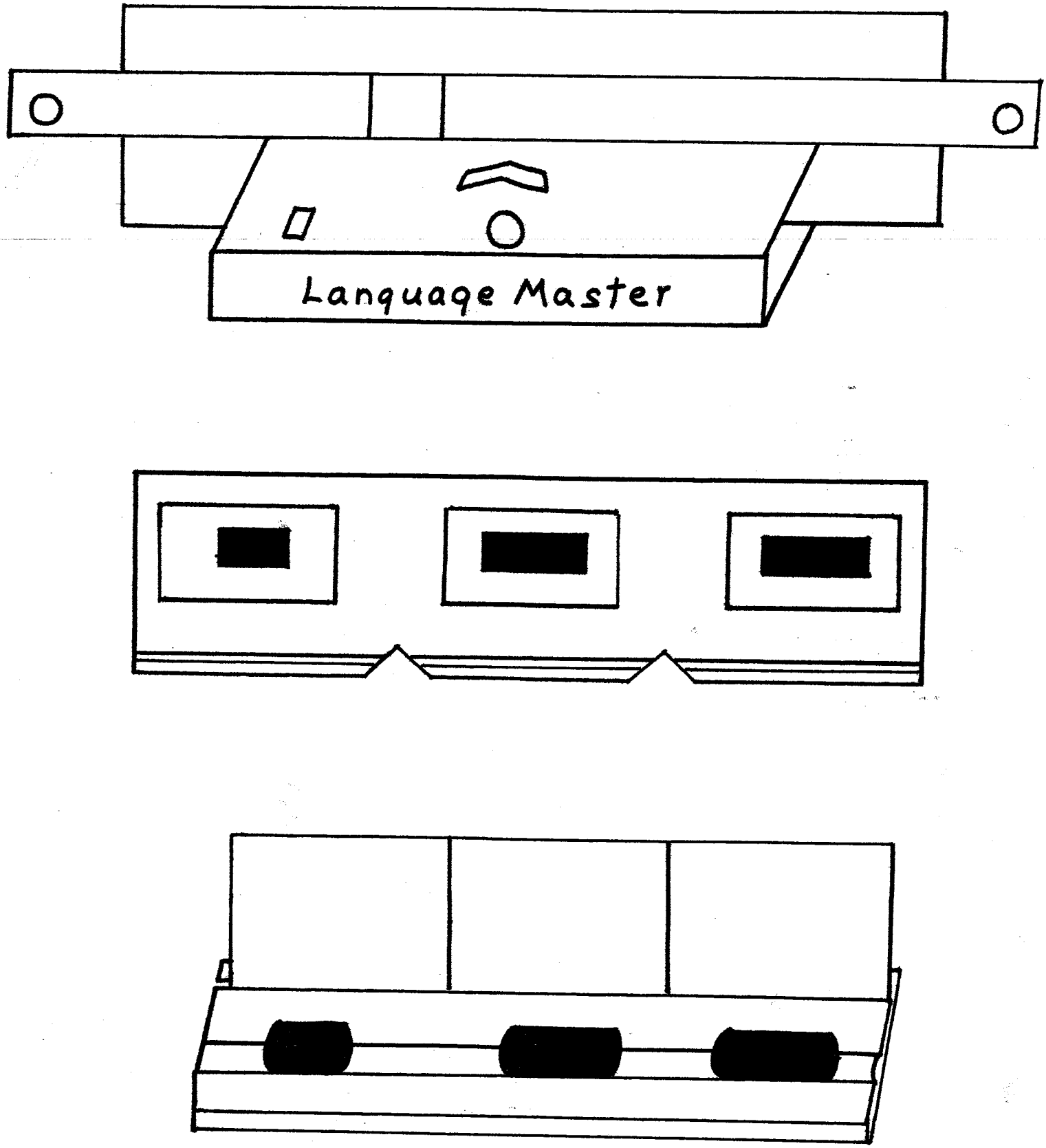

Fig. 4

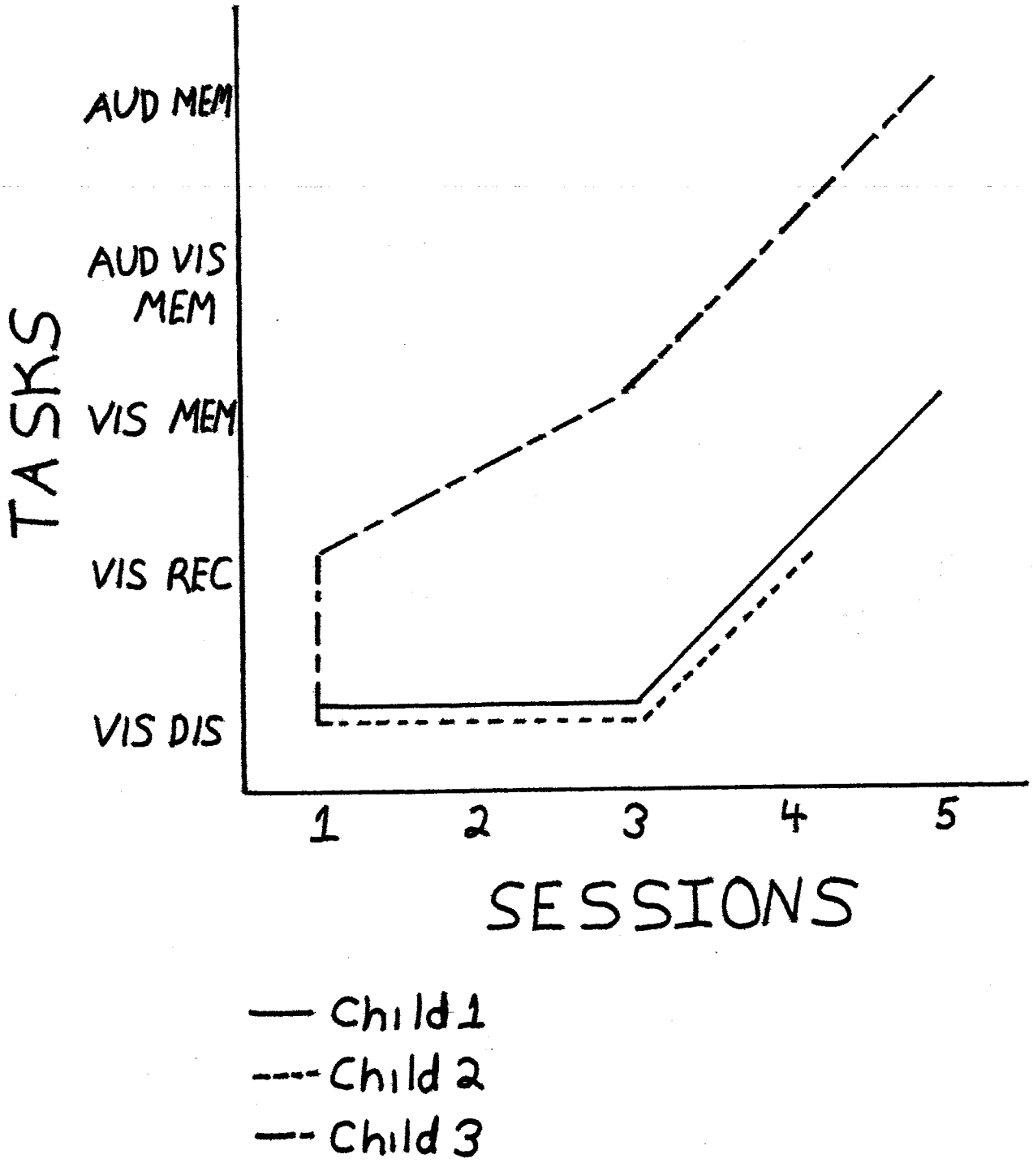
AUD MEM
AUD VIS MEM
VIS MEM
VIS REC
VIS DIS
TASKS
1
2
3
4
5
SESSIONS
Child 1
Child 2
Child 3

Fig. 5

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